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DTE Energy



10CFR50.73

November 17, 2009
NRC-09-0067

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington D C 20555-0001

Reference: Fermi 2
NRC Docket No. 50-341
NRC License No. NPF-43

Subject: Licensee Event Report No. 2009-002, "Manual Reactor Scram
Due to Hydrogen Leakage Into the Stator Water Cooling System"

Pursuant to 10 CFR 50.73(a)(2)(iv)(A), Detroit Edison is hereby submitting the enclosed Licensee Event Report (LER) No. 2009-002. This LER documents a manual scram that occurred on September 30, 2009 when plant operators placed the reactor mode switch in shutdown due to increasing leakage of hydrogen from the main generator into the stator water cooling system.

No commitments are made in this LER.

Should you have any questions or require additional information, please contact Mr. Rodney W. Johnson of my staff at (734) 586-5076.

Sincerely,

cc: NRC Project Manager
NRC Resident Office
Reactor Projects Chief, Branch 4, Region III
Regional Administrator, Region III
Supervisor, Electric Operators,
Michigan Public Service Commission

JE22
NRR

NRC FORM 366 (9-2007)		U.S. NUCLEAR REGULATORY COMMISSION		APPROVED BY OMB: No. 3150-0104 Expires 8/31/2010																			
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1. FACILITY NAME Fermi 2			2. DOCKET NUMBER 05000341		3. PAGE 1 OF 3																		
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12. LICENSEE CONTACT FOR THIS LER																							
FACILITY NAME Robert J Salmon – Principal Licensing Engineer				TELEPHONE NUMBER (Include Area Code) (734) 586-4273																			
13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT																							
CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX														
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ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) <p>At 11:09 EDT on September 30, 2009, the reactor mode switch was taken to shutdown and the main turbine generator was manually tripped in response to hydrogen gas leakage into the stator water cooling system from the main generator. The reactor protection system performed as expected, and all control rods fully inserted into the core. Reactor water level reached a low of approximately 122 inches above top of active fuel and recovered to normal level automatically without operator intervention. Reactor water level was maintained above Level 2, and as expected, none of the primary containment isolations or safety injection systems initiations associated with Level 2 occurred. The main steam isolation valves remained open, and the reactor feedwater system automatically restored and maintained reactor water level. The main steam bypass valves opened and automatically controlled reactor pressure. There was no transient increase in reactor dome pressure and no safety relief valves (SRVs) actuated. All primary containment isolations and actuations for reactor water Level 3 occurred as expected. The manual scram was inserted due to hydrogen leakage from the generator hydrogen cooling system into the stator water cooling system that exceeded a predetermined maximum allowable operational leakage rate. A leak in the generator stator water cooling system was located and repaired in accordance with the generator manufacturer's recommendations.</p>																							

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17. NARRATIVE (If more space is required, use additional copies of NRC Form 366A)

Initial Plant Conditions:

Mode 1
Reactor Power 100% percent

Description of the Event

At 11:09 EDT on September 30, 2009, the reactor mode switch [HS] was taken to shutdown and the main turbine generator [TA] was manually tripped in response to hydrogen gas leakage into the stator water cooling system [TJ] from the main generator [TB]. The Operations Department had been performing frequent additions of water to the stator water cooling head tank which is indicative of increased in-leakage of hydrogen into the system. This had been identified as an Operational Decision Making Issue and an assessment of the condition had been performed. The rate of water addition and hydrogen in-leakage was being closely monitored, and trigger points and actions were developed to address this condition. Preparations were also being made for an orderly shutdown to address the problem. As part of this process, limits were set for a leakage rate past which operation should not be continued. Operating Experience indicated that these types of leaks can progress very slowly or more rapidly. When a rapid increase in the hydrogen leakage rate was observed in excess of the predetermined trigger point, the reactor was promptly shutdown.

The scram was uncomplicated. The reactor protection system (RPS) [JD] performed as expected, and all control rods fully inserted into the core. Reactor water level reached a low of approximately 122 inches above top of active fuel and recovered to normal level automatically without operator intervention. Reactor water level was maintained above Level 2, and as expected, none of the primary containment isolations or safety injection systems initiations associated with Level 2 occurred. The main steam isolation valves (MSIVs) remained open, and the reactor feedwater [SJ] system automatically restored reactor water level and maintained it in the normal band of 173 to 214 inches. The main steam bypass valves [JI] opened and automatically controlled reactor pressure. There was no transient increase in reactor dome pressure and no safety relief valves (SRVs) actuated. All primary containment isolations [JM] and actuations for reactor water Level 3 occurred as expected. At the time of the manual scram all Emergency Core Cooling Systems (ECCS) and Emergency Diesel Generators (EDGs) [DG] were operable, and safety related plant equipment responded as expected to the scram. There were no structures, systems, or components that were inoperable at the start of the event that contributed to the event.

This report is being made in accordance with 10 CFR 50.73(a)(2)(iv)(A), as an event that resulted in an unplanned manual actuation of the reactor protection system (RPS) when the reactor was critical.

Significant Safety Consequences and Implications

This event posed no significant safety implications because the reactor protection and safety related systems functioned as designed following the manual reactor trip. Important safety-related and non-safety related equipment performed as discussed in the description of the event, and plant response was as expected. There was no increase in reactor pressure, and the reactor core was adequately covered and cooled throughout the event.

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Therefore, the health and safety of the public were not affected by this event.

This event is being reported under 10 CFR 50.73(a)(2)(iv)(A), as an event or condition that resulted in manual actuation of the reactor protection system and a reactor scram. A 4-hour non-emergency notification was made to the NRC Operations Center at 14:11 EDT on September 30, 2009 (EN 45394) in accordance with 10 CFR 50.72(b)(2)(iv)(B) for an actuation of the reactor protection system.

Cause of the Event

The manual scram was inserted due to hydrogen leakage from the generator hydrogen cooling system into the stator water cooling system that exceeded a predetermined maximum allowable operational leakage rate. The cause of the leak was attributed to a particle of carbon steel in the generator end winding area. The particle was magnetized and oscillated with the four-pole rotor field. The oscillation, in conjunction with a magnetic attraction towards the stator bar, damaged end winding insulation laminates over time, eventually reaching the copper stator water bar. The oscillation of the particle continued until a hole was worn into the generator stator water bar, allowing hydrogen gas to leak into the generator stator water.

Corrective Actions

The leak in the generator stator water cooling system was located and repaired in accordance with the generator manufacturer's recommendations. Other preventive and corrective maintenance tasks, and a thorough cleaning and magnetic sweeping of the generator internals were also performed during the outage. This event is documented and evaluated in the Fermi 2 corrective action program. Other actions are being considered to address this event. These actions will be tracked and implemented by the corrective action program.

Additional Information

- A. Failed Components: Main Turbine Generator
Component: Stator Water Cooling System
Function: Generator Stator Cooling
Manufacturer: English Electric (Alstom)
Model Number: N/A
Failure Cause: Foreign Material
- B. Previous LERs on Similar Problems: None